

A 36.25: R 36<sup>5</sup>

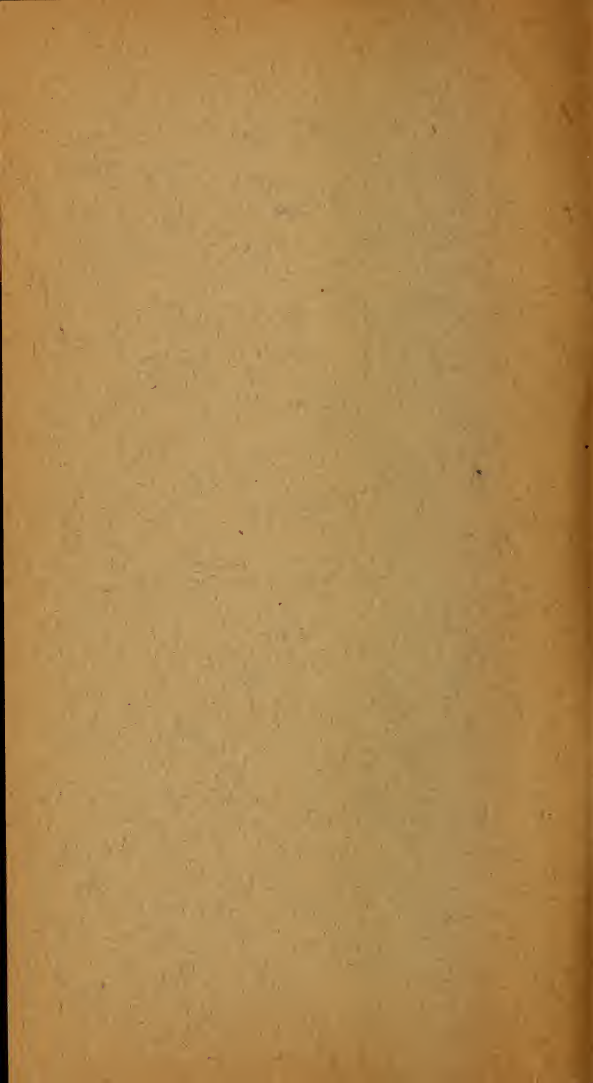
# Handbook of Official Standards for Milled Rice, Brown Rice, and Rough Rice



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Washington, D. C.  
1928



U. S. Department of Agriculture  
Bureau of Agricultural Economics

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Handbook of  
Official Standards for  
Milled Rice, Brown Rice  
and Rough Rice

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Official standards of the United States  
as established and promulgated by  
the Secretary of Agriculture

Important features of  
rice inspection and grading

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United States  
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# OFFICIAL STANDARDS FOR MILLED RICE, BROWN RICE, AND ROUGH RICE

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DEPARTMENT OF AGRICULTURE,  
WASHINGTON, D. C.

By virtue of the authority vested in the Secretary of Agriculture by the act of Congress entitled "An act making appropriations for the Department of Agriculture for the fiscal year ending June 30, 1928, and for other purposes," approved January 18, 1927 (Public No. 522, 69th Cong.), I, W. M. Jardine, Secretary of Agriculture, do hereby fix, establish, and promulgate the following standards of class, quality, and condition for Milled Rice, Brown Rice, and Rough Rice, which shall become the official standards of the United States for the inspection and certification of such rices on the 15th day of September, 1927, and be in force and effect as long as Congress shall provide the necessary authority therefor, unless amended or superseded by standards hereafter prescribed and promulgated under such authority.

In testimony whereof I have hereunto set my hand and caused the official seal of the Department of Agriculture to [SEAL.] be affixed, in the city of Washington, this 6th day of September, 1927.

W. M. JARDINE,  
*Secretary.*

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## U. S. STANDARDS FOR MILLED RICE

For the purposes of the United States standards for milled rice:

**Milled rice.**—Milled rice shall be whole or broken kernels of rice grown in continental United States, from which the hulls and practically all of the germs and bran layers have been removed, which may be either coated or uncoated, and which does not contain more than 10 per cent of cereal grains, including paddy grains, seeds, or other foreign material, either singly or in any combination.

**HONDURAS MILLED RICE (CLASS I)**

This class shall include the rices known commercially as Honduras and Mortgage Lifter, which contain more than 25 per cent of whole kernels, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

**EDITH MILLED RICE (CLASS II)**

This class shall include the rice known commercially as Edith, which contains more than 25 per cent of whole kernels, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

**FORTUNA MILLED RICE (CLASS III)**

This class shall include the rice known commercially as Fortuna, which contains more than 25 per cent of whole kernels, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

**CAROLINA MILLED RICE (CLASS IV)**

This class shall include the rices known commercially as Carolina and Storm Proof, which contains more than 25 per cent of whole kernels, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

**LADY WRIGHT MILLED RICE (CLASS V)**

This class shall include the rice known commercially as Lady Wright, which contains more than 25 per cent of whole kernels, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

*Grade requirements for the classes Honduras, Edith, Fortuna, Carolina, and Lady Wright milled rice*

Grade	Maximum limits of—						
	Cereal grains, seeds, and heat damage (number in 500 grams)		Red rice and damage other than heat (singly or combined)	Chalky kernels	Broken kernels		Other rices
	Total	Heat damage and seeds (singly or combined)			Total	Through No. 6 sieve	
Extra Fancy (U. S. No. 1)-----	No. 3	No. 1	P. ct. 0.5	P. ct. 1.0	P. ct. 10	P. ct. 0.3	P. ct. 1
Fancy (U. S. No. 2)-----	7	4	1.5	1.5	15	.5	2
Extra Choice (U. S. No. 3)-----	12	7	2.0	2.0	20	.7	4
Choice (U. S. No. 4)-----	18	10	2.5	3.0	25	1.0	6
Medium (U. S. No. 5)-----	40	25	6.0	6.0	35	2.0	10

Sample grade: Sample grade shall be milled rice of the classes Honduras, or Edith, or Fortuna, or Carolina, or Lady Wright, respectively, which does not come within the requirements of any of the grades from Extra Fancy (U. S. No. 1) to Medium (U. S. No. 5), inclusive, or which has any commercially objectionable foreign odor, or is musty, or sour, or is heating, or hot, or is of a badly damaged or extremely red appearance, or is otherwise of distinctly low quality, or contains more than 0.1 per cent of foreign material excepting paddy grains, other cereal grains, and seeds.

The percentage of moisture in the grades Extra Fancy (U. S. No. 1), Fancy (U. S. No. 2), Extra Choice (U. S. No. 3), Choice (U. S. No. 4), and Medium (U. S. No. 5) shall not exceed 14.5.

*Color and general appearance.*—Rice of the grade Extra Fancy (U. S. No. 1) shall be white or creamy and shall be well milled. Rice of the grade Fancy (U. S. No. 2) shall be white, creamy, or grayish, and shall be well milled. Rice of the grade Extra Choice (U. S. No. 3) shall be white, creamy, or grayish, and shall be reasonably well milled. Rice of the grade Choice (U. S. No. 4) shall be white, creamy, or grayish, and may be slightly rosy, and shall be reasonably well milled. Rice of the grade Medium (U. S. No. 5) may be of slightly damaged or red appearance.

**BLUE ROSE MILLED RICE (CLASS VI)**

This class shall include the rices known commercially as Blue Rose, Greater Blue Rose, and Improved Blue Rose, which contain more than 25 per cent of whole kernels and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

**EARLY PROLIFIC MILLED RICE (CLASS VII)**

This class shall include the rice known commercially as Early Prolific, which contains more than 25 per cent of whole kernels and may include not more than 10 per cent of whole kernels of rice of any other class or classes.



*Grade requirements for the classes Blue Rose and Early Prolific milled rice*

Grade	Maximum limits of—						
	Cereal grains, seeds, and heat damage (number in 500 grams)		Red rice and damage other than heat (singly or combined)	Chalky kernels	Broken kernels		Other rices
	Total	Heat damage and seeds (singly or combined)			Total	Through No. 6 sieve	
Extra Fancy (U. S. No. 1)-----	No. 3	No. 1	P. ct. 0.5	P. ct. 1.0	P. ct. 5	P. ct. 0.3	P. ct. 1
Fancy (U. S. No. 2)---	7	4	1.5	1.5	10	.5	2
Extra Choice (U. S. No. 3)-----	12	7	2.0	2.0	15	.7	4
Choice (U. S. No. 4)---	18	10	2.5	3.0	20	1.0	6
Medium (U. S. No. 5)---	40	25	6.0	6.0	35	2.0	10

Sample grade: Sample grade shall be milled rice of the classes Blue Rose or Early Prolific, respectively, which does not come within the requirements of any of the grades from Extra Fancy (U. S. No. 1) to Medium (U. S. No. 5), inclusive, or which has any commercially objectionable foreign odor, or is musty, or sour, or is heating, or hot, or is of a badly damaged or extremely red appearance, or is otherwise of distinctly low quality, or contains more than 0.1 per cent of foreign material, excepting paddy grains, other cereal grains, and seeds.

The percentage of moisture in the grades Extra Fancy (U. S. No. 1), Fancy (U. S. No. 2), Extra Choice (U. S. No. 3), Choice (U. S. No. 4), and Medium (U. S. No. 5) shall not exceed 14.5.

*Color and general appearance.*—Rice of the grade Extra Fancy (U. S. No. 1) shall be white or creamy and shall be well milled. Rice of the grade Fancy (U. S. No. 2) shall be white, creamy, or grayish, and shall be well milled. Rice of the grade Extra Choice (U. S. No. 3) shall be white, creamy, or grayish, and shall be reasonably well milled. Rice of the grade Choice (U. S. No. 4) shall be white, creamy, or grayish, and may be slightly rosy, and shall be reasonably well milled. Rice of the grade Medium (U. S. No. 5) may be of slightly damaged or red appearance.

**JAPAN MILLED RICE (CLASS VIII)**

This class shall include the rices known commercially as Japan, which contain more than 25 per cent of whole kernels, and may include not more than 10 per cent of whole kernels of rice of any other class or classes. This class shall be divided into two subclasses: (a) Japan milled rice and (b) California-Japan milled rice.

**SUBCLASS (A) JAPAN MILLED RICE**

This subclass shall include all rices known commercially as Japan possessing the characteristics of rice of this class as grown east of the Rocky Mountains.

*Grade requirements for the subclass Japan milled rice*

Grade	Maximum limits of—						
	Cereal grains, seeds, and heat damage (number in 500 grams)		Red rice and damage other than heat (singly or combined)	Chalky kernels	Broken kernels		Other rices
	Total	Heat damage and seeds (singly or combined)			Total	Through No. 6 sieve	
Extra Fancy (U. S. No. 1).....	No. 3	No. 1	P. ct. 0.5	P. ct. 2.0	P. ct. 5	P. ct. 0.3	P. ct. 1
Fancy (U. S. No. 2).....	7	4	1.5	4.0	10	.5	2
Extra Choice (U. S. No. 3).....	12	7	2.0	6.0	15	.7	4
Choice (U. S. No. 4).....	18	10	2.5	8.0	20	1.0	6
Medium (U. S. No. 5).....	40	25	6.0	10.0	35	2.0	10

Sample grade: Sample grade shall be milled rice of the subclass Japan milled rice, respectively, which does not come within the requirements of any of the grades from Extra Fancy (U. S. No. 1) to Medium (U. S. No. 5), inclusive, or which has any commercially objectionable foreign odor, or is musty, or sour, or is heating, or hot, or is of a badly damaged or extremely red appearance, or is otherwise of distinctly low quality, or contains more than 0.1 per cent of foreign material excepting paddy grains, other cereal grains, and seeds.

The percentage of moisture in the grades Extra Fancy (U. S. No. 1), Fancy (U. S. No. 2), Extra Choice (U. S. No. 3), Choice (U. S. No. 4), and Medium (U. S. No. 5) shall not exceed 14.5.

*Color and general appearance.*—Rice of the grade Extra Fancy (U. S. No. 1) shall be white or creamy and shall be well milled. Rice of the grade Fancy (U. S. No. 2) shall be white, creamy, or grayish, and shall be well milled. Rice of the grade Extra Choice (U. S. No. 3) shall be white, creamy, or grayish, and shall be reasonably well milled. Rice of the grade Choice (U. S. No. 4) shall be white, creamy, or grayish, and may be slightly rosy, and shall be reasonably well milled. Rice of the grade Medium (U. S. No. 5) may be of slightly damaged or red appearance.

## SUBCLASS (B) CALIFORNIA-JAPAN MILLED RICE

This subclass shall include all rices known commercially as Japan, possessing the characteristics of rice of this class as grown west of the Great Plains area of the United States.

*Grade requirements for the subclass (b) California-Japan milled rice*

Grade	Maximum limits of—						
	Cereal grains, seeds, and heat damage (number in 500 grams)		Red rice, and damage other than heat (singly or combined)	Chalky kernels	Broken kernels		Other rices
	Total	Heat damage			Total	Through No. 6 sieve	
Extra Fancy <sup>1</sup> (U. S. No. 1).....	No. 3	No. 0	P. ct. 0.2	P. ct. 2.0	P. ct. 5	P. ct. 0.3	P. ct. 0.2
Fancy (U. S. No. 2)...	7	2	.5	4.0	10	.5	.4
Extra Choice (U. S. No. 3).....	12	3	1.0	6.0	15	.7	1.0
Choice (U. S. No. 4)...	18	5	1.5	8.0	20	1.0	3.0
Medium (U. S. No. 5)...	25	7	2.0	10.0	25	2.0	5.0

Sample grade: Sample grade shall be milled rice of the subclass California-Japan milled rice which does not come within the requirements for any of the grades from Extra Fancy (U. S. No. 1) to Medium (U. S. No. 5), inclusive, or which has any commercially objectionable foreign odor, or is musty, or sour, or is heating, or hot, or is of a badly damaged or extremely red appearance, or is otherwise of distinctly low quality, or contains more than 0.1 per cent of foreign material excepting paddy grains, other cereal grains, and seeds.

The percentage of moisture in the grades Extra Fancy (U. S. No. 1), Fancy (U. S. No. 2), Extra Choice (U. S. No. 3), Choice (U. S. No. 4), and Medium (U. S. No. 5) shall not exceed 14.5.

*Color and general appearance.*—Rice of the grade Extra Fancy (U. S. No. 1) shall be white or creamy and shall be well milled. Rice of the grade Fancy (U. S. No. 2) shall be white, creamy, or grayish, and shall be well milled. Rice of the grade Extra Choice (U. S. No. 3) shall be white, creamy, or grayish, and shall be reasonably well milled. Rice of the grade Choice (U. S. No. 4) shall be white, creamy, or grayish, and may be slightly rosy, and shall be reasonably well milled. Rice of the grade Medium (U. S. No. 5) may be of slightly damaged or red appearance.

<sup>1</sup> The grade Extra Fancy shall contain no cereal grains other than paddy grains and may contain not more than one mud lump.

**SECOND HEAD MILLED RICE (CLASS IX)**

This class shall consist of milled rice which contains not more than 25 per cent of whole kernels, not more than 50 per cent of broken kernels which will pass readily through a  $6\frac{1}{2}$  sieve, and not more than 10 per cent of broken kernels which will pass readily through a No. 6 sieve.

*Grade requirements for the class Second Head milled rice*

Grade	Maximum limits of—					
	Cereal grains, seeds, and heat damage (number in 500 grams)		Red rice and damage other than heat (singly or combined)	Chalky kernels	Broken kernels	
	Total	Heat damage and seeds (singly or combined)			Through No. 6 sieve	Through No. 6½ sieve
	No.	No.	P. ct.	P. ct.	P. ct.	P. ct.
Extra Fancy (U. S. No. 1).....	20	15	1	3	3	15
Fancy (U. S. No. 2).....	25	20	2	5	5	25
Extra Choice (U. S. No. 3).....	40	35	4	10	7	35
Choice (U. S. No. 4).....	60	50	6	15	10	50
Medium (U. S. No. 5).....	110	100	10	20	10	50

Sample grade: Sample grade shall be milled rice of the class Second Head which does not come within the requirements of any of the grades from Extra Fancy (U. S. No. 1) to Medium (U. S. No. 5), inclusive, or which has any commercially objectionable foreign odor, or is musty, or sour, or is heating, or hot, or is of a badly damaged or extremely red appearance, or is otherwise of distinctly low quality, or contains more than 0.1 per cent of foreign material, excepting paddy grains, other cereal grains, and seeds.

The percentage of moisture in grades Extra Fancy (U. S. No. 1), Fancy (U. S. No. 2), Extra Choice (U. S. No. 3), Choice (U. S. No. 4), and Medium (U. S. No. 5) shall not exceed 14.5.

*Color and general appearance.*—Rice of the grades Extra Fancy (U. S. No. 1), Fancy (U. S. No. 2), and Extra Choice (U. S. No. 3) shall be white, creamy, or grayish. Rice of the grade Choice (U. S. No. 4) may be of slightly damaged or slightly rosy appearance. Rice of the grade Medium (U. S. No. 5) may be of slightly damaged or red appearance,

**SCREENINGS MILLED RICE (CLASS X)**

This class shall consist of milled rice which contains not more than 25 per cent of whole kernels, which does not meet the requirements of size separations specified for the class Second Head milled rice, and which contains not more than 15 per cent of broken kernels which will pass readily through a No. 5½ sieve. This class shall be divided into two subclasses: (a) Screenings milled rice and (b) California-Japan Screenings milled rice.

**SUBCLASS (A) SCREENINGS MILLED RICE**

This subclass shall include all Screenings milled rice possessing the characteristics of rice of this class as grown east of the Rocky Mountains.



*Grade requirements for the subclass Screenings milled rice*

Grade	Maximum limits of—			
	Cereal grains and seeds (number in 500 grams)	Chalky kernels	Broken kernels	
			Through No. 5½ sieve	Through No. 6 sieve
	<i>Number</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
Extra Fancy (U. S. No. 1)	20	5	4	20
Fancy (U. S. No. 2) -----	50	8	6	30
Extra Choice (U. S. No. 3) -----	90	12	8	40
Choice (U. S. No. 4) -----	140	20	10	50
Medium (U. S. No. 5) ---	250	30	15	60

Sample grade: Sample grade shall be milled rice of the subclass Screenings milled rice which does not come within the requirements of any of the grades from Extra Fancy (U. S. No. 1) to Medium (U. S. No. 5), inclusive, or which has any commercially objectionable foreign odor, or is musty, or sour, or is heating, or hot, or is of a badly damaged or extremely red appearance, or is otherwise of distinctly low quality, or contains more than 0.1 per cent of foreign material, excepting paddy grains, other cereal grains, and seeds.

The percentage of moisture in grades Extra Fancy (U. S. No. 1), Fancy (U. S. No. 2), Extra Choice (U. S. No. 3), Choice (U. S. No. 4), and Medium (U. S. No. 5) shall not exceed 14.5.

*Color and general appearance.*—Rice of the grades Extra Fancy (U. S. No. 1) and Fancy (U. S. No. 2) shall be white, creamy, or grayish. Rice of the grade Extra Choice (U. S. No. 3) shall be white, creamy, or grayish, and may be slightly rosy. Rice of the grade Choice (U. S. No. 4) may be of slightly damaged or rosy appearance. Rice of the grade Medium (U. S. No. 5) may be of damaged or red appearance.

NOTE.—The grade term "Medium" (U. S. No. 5) for the subclass Screenings milled rice corresponds to the grade term "F. A. Q. Screenings," heretofore commonly used commercially.

SUBCLASS (B) CALIFORNIA-JAPAN SCREENINGS  
MILLED RICE

This subclass shall include all Screenings milled rice made from the rice known commercially as Japan possessing the characteristics of rice of this class as grown west of the Great Plains area of the United States.

*Grade requirements for the subclass California-Japan Screenings milled rice*

Grade	Maximum limits of—			
	Cereal grains and seeds (number in 500 grams)	Chalky kernels	Broken kernels	
			Through No. 5½ sieve	Through No. 6 sieve
	<i>Number</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
Extra Fancy (U. S. No. 1)---	30	5	4	20
Fancy (U. S. No. 2)-----	75	8	6	30
Extra Choice (U. S. No. 3)---	125	12	8	40
Choice (U. S. No. 4)-----	175	20	10	50
Medium (U. S. No. 5)-----	250	20	10	50

Sample grade: Sample grade shall be milled rice of the subclass California Japan Screenings milled rice which does not come within the requirements of any of the grades from Extra Fancy (U. S. No. 1) to Medium (U. S. No. 5), inclusive, or which has any commercially objectionable foreign odor, or is musty, or sour, or is heating, or hot, or is of a badly damaged or extremely red appearance, or is otherwise of distinctly low quality, or contains more than 0.1 per cent of foreign material, excepting paddy grains, other cereal grains, and seeds.

The percentage of moisture in grades Extra Fancy (U. S. No. 1), Fancy (U. S. No. 2), Extra Choice (U. S. No. 3), Choice (U. S. No. 4), and Medium (U. S. No. 5) shall not exceed 14.5.

*Color and general appearance.*—Rice of the grades Extra Fancy (U. S. No. 1), Fancy (U. S. No. 2), Extra Choice (U. S. No. 3), and Choice (U. S. No. 4) shall be white, creamy, or grayish. Rice of the grade Medium (U. S. No. 5) may be slightly damaged or slightly rosy.

**BREWERS MILLED RICE (CLASS XI)**

This class shall consist of milled rice which contains not more than 25 per cent of whole kernels and contains more than 15 per cent of broken kernels which will pass readily through a No. 5½ sieve. This class shall be divided into two subclasses: (a) Brewers milled rice and (b) California-Japan Brewers milled rice.

**SUBCLASS (A) BREWERS MILLED RICE**

This subclass shall include all Brewers milled rice possessing the characteristics of rice of this class as grown east of the Rocky Mountains.

*Grade requirements for the subclass Brewers milled rice*

Grade	Cereal grains and seeds (maximum limits)		Color and general appearance
	Number in 500 grams	Percentage	
Extra Fancy (U. S. No. 1).	60	-----	White, creamy, or grayish.
Fancy (U. S. No. 2).	-----	0.1	Do.
Extra Choice (U. S. No. 3).	-----	.2	White, creamy, or grayish, and may be slightly rosy.
Choice (U. S. No. 4).	-----	.4	May be of slightly damaged or rosy appearance.
Medium (U. S. No. 5).	-----	1.5	May be of damaged or red appearance.

Sample grade: Sample grade shall be milled rice of the subclass Brewers milled rice which does not come within the requirements of any of the grades from Extra Fancy (U. S. No. 1) to Medium (U. S. No. 5), inclusive, or which has any commercially objectionable foreign odor, or is musty, or sour, or heating or hot, or is of a badly damaged or extremely red appearance, or is otherwise of distinctly low quality, or contains more than 0.1 per cent of foreign material excepting paddy grains, other cereal grains, and seeds.

The percentage of moisture in grades Extra Fancy (U. S. No. 1), Fancy (U. S. No. 2), Extra Choice (U. S. No. 3), Choice (U. S. No. 4), and Medium (U. S. No. 5) shall not exceed 14.5.

NOTE.—The grade term Medium (U. S. No. 5) for the subclass Brewers milled rice corresponds to the grade term "Standard Milled-Run Brewers" heretofore commonly used commercially.

SUBCLASS (B) CALIFORNIA-JAPAN BREWERS  
MILLED RICE

This subclass shall include all Brewers milled rice made from the rices known commercially as Japan possessing the characteristics of rice of this class as grown west of the Great Plains area of the United States.

*Grade requirements for the subclass California-Japan Brewers milled rice*

Grades	Cereal grains and seeds (maximum limits)	Color and general appearance
	<i>Per cent</i>	
Extra Fancy (U. S. No. 1).	0.5	White, creamy, or grayish.
Fancy (U. S. No. 2) --	1.0	Do.
Extra Choice (U. S. No. 3).	1.5	Do.
Choice (U. S. No. 4) --	3.0	May be slightly damaged or slightly rosy.
Medium (U. S. No. 5) --	5.0	May be damaged or rosy.

Sample grade: Sample grade shall be milled rice of the subclass California-Japan Brewers milled rice which does not come within the requirements of any of the grades from Extra Fancy (U. S. No. 1) to Medium (U. S. No. 5), inclusive, or which has any commercially objectionable foreign odor, or is musty, or sour, or is heating, or hot, or is of a badly damaged or extremely red appearance, or is otherwise of distinctly low quality, or contains more than 0.1 per cent of foreign material excepting paddy grains, other cereal grains, and seeds.

The percentage of moisture in grades Extra Fancy (U. S. No. 1), Fancy (U. S. No. 2), Extra Choice (U. S. No. 3), Choice (U. S. No. 4), and Medium (U. S. No. 5) shall not exceed 14.5

**GRADES FOR MIXED MILLED RICE**

**Mixed milled rice.**—Mixed milled rice shall be a mixture of any two or more of Classes I, II, III, IV, V, VI, VII, and VIII, which does not meet the requirements of any one of such classes.

Mixed milled rice shall be graded according to each of the grade requirements common to the class or subclass of the milled rice which predominates over each other class or subclass in the mixture, except that all of the grade requirements in any class as to the maximum percentages of other rices shall be disregarded. The grade designation of mixed milled rice shall include, successively, in the order named, the name of the grade, or the number thereof, the word "Mixed," and, in the order of its predominance, the name and approximate percentage of each class or subclass of milled rice which constitutes 10 per cent or more of the mixture; but if only one class or subclass exceeds 10 per cent of the mixture, the name and approximate percentage of that class or subclass shall be added to the grade designation, followed by the name and approximate percentage of at least one other class or subclass.

**GRADES FOR COATED MILLED RICE**

**Coated milled rice.**—Coated milled rice shall be milled rice which has been coated with glucose and talc or any other substance.

Coated milled rice shall be graded and designated according to the grade requirements of the grades applicable to such rice if it were not



coated, and there shall be added to and made a part of such grade designation the word "Coated."

#### GRADES FOR WEEVILY MILLED RICE

**Weevily milled rice.**—Weevily milled rice shall be milled rice in which adult live weevils or other insects injurious to stored rice, or their larvae, or clusters of webby material are found in a number exceeding 1 in 500 grams of milled rice.

Weevily milled rice shall be graded and designated according to the grade requirements of the grades applicable to such rice if it were not weevily, and there shall be added to and made a part of such grade designation the word "Weevily."

#### DEFINITIONS

**Basis of determinations.**—Each determination of cereal grains, seeds, or other foreign material, heat-damaged kernels, temperature, odor, live weevils, or other insects injurious to stored rice, moisture content, and general appearance shall be made on the basis of the grain including foreign material. All other determinations shall be made on the basis of the grain when free from foreign material.

**Percentages.**—Percentages, except in the case of moisture, shall be percentages ascertained by weight.

**Percentage of moisture.**—Percentage of moisture shall be that ascertained by the moisture tester and the method of use thereof described

in Bulletin 1375, dated February, 1926, issued by the United States Department of Agriculture, Bureau of Agricultural Economics, or ascertained by any device and method giving equivalent results.

**No. 5½ sieve.**—A metal sieve perforated with round holes five and one-half sixty-fourths inch in diameter.

**No. 6 sieve.**—A metal sieve perforated with round holes six sixty-fourths inch in diameter.

**No. 6½ sieve.**—A metal sieve perforated with round holes six and one-half sixty-fourths inch in diameter.

**Damaged kernels.**—Damaged kernels shall be kernels and pieces of kernels of milled rice which have been distinctly damaged by water, insects, or by any other means. Sound double and sound broken kernels shall not be considered damaged kernels.

**Heat-damaged kernels.**—Heat-damaged kernels shall be kernels and pieces of kernels of milled rice which have been distinctly discolored by external heat or as a result of heating caused by fermentation.

**Cereal grains.**—Cereal grains shall include paddy grains (rough rice), barley, wheat, rye, emmer, spelt, einkorn, corn, grain sorghums, and oats, and shall not include buckwheat, flaxseed, and wild oats.

**Seeds.**—Seeds shall be grains, kernels, or seeds, either whole or broken, of any plant other than rice or cereal grains.

**Red rice.**—Red rice shall be kernels or pieces of kernels of milled rice which are distinctly red in color or have any appreciable amount of red bran thereon.

**Broken kernels.**—Broken kernels shall be split kernels of milled rice and pieces of kernels which are less than three-fourths of the length of the perfect kernel.

**Chalky kernels.**—Chalky kernels shall be kernels and pieces of kernels of milled rice one-half or more of which is chalky.

## STANDARDS FOR BROWN RICE

For the purposes of the United States standards for brown rice:

**Brown rice.**—Brown rice shall be rice grown in continental United States from which the hulls only have been removed from not less than 90 per cent of the kernels, and which does not contain more than 10 per cent of cereal grains of a kind or kinds other than rice, seeds, or other foreign material, either singly or in any combination.

**NOTE.**—Brown rice for the purposes of the standards is divided into classes and subclasses as follows: Class I, Honduras brown rice; Class II, Edith brown rice; Class III, Fortuna brown rice; Class IV, Carolina brown rice; Class V, Lady Wright brown rice; Class VI, Blue Rose brown rice; Class VII, Early Prolific brown rice; Class VIII, Japan brown rice, divided into subclasses (a) Japan brown rice and (b) California-Japan brown rice; and Mixed brown rice.

**HONDURAS BROWN RICE (CLASS I)**

This class shall include the rices known commercially as Honduras and Mortgage Lifter, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

**EDITH BROWN RICE (CLASS II)**

This class shall include the rice known commercially as Edith, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

**FORTUNA BROWN RICE (CLASS III)**

This class shall include the rice known commercially as Fortuna, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

**CAROLINA BROWN RICE (CLASS IV)**

This class shall include the rices known commercially as Carolina and Storm Proof, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

**LADY WRIGHT BROWN RICE (CLASS V)**

This class shall include the rice known commercially as Lady Wright, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

*Grade requirements for the classes Honduras, Edith, Fortuna, Carolina, and Lady Wright brown rice*

United States grade	Maximum limits of—										
	Cereal grains, seeds, mud lumps, and heat-damaged kernels (number in 500 grams)				Paddy grains	Red rice	Damage other than heat	Chalky kernels	Broken kernels		Other rices
	Cereal grains	Seeds	Heat-damaged kernels	Mud lumps					Total	Through $6\frac{1}{2}$ sieve	
No.	No.	No.	No.	%	%	%	%	%	%	%	
Extra Fancy---	0	2	0	1	0.2	0.5	1	1.5	10	1	1
Fancy-----	1	5	1	2	.4	1.0	3	2.5	15	2	2
Choice-----	5	10	5	5	1.0	3.0	5	5.0	20	3	4

Sample grade: Sample grade shall be brown rice of the class Honduras, Edith, Fortuna, Carolina, or Lady Wright, respectively, which does not come within the requirements for any of the grades from Extra Fancy to Choice, inclusive, or which has any commercially objectionable foreign odor, or is musty or sour, or is heating, or hot, or is of a badly damaged or badly stained appearance, or is otherwise of distinctly low quality, or contains more than 0.1 per cent of foreign material excepting paddy grains, other cereal grains, seeds, and mud lumps, or contains more than 14.5 per cent of moisture.

**BLUE ROSE BROWN RICE (CLASS VI)**

This class shall include the rices known commercially as Blue Rose, Greater Blue Rose, and Improved Blue Rose, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

**EARLY PROLIFIC BROWN RICE (CLASS VII)**

This class shall include the rice known commercially as Early Prolific, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

**JAPAN BROWN RICE (CLASS VIII)**

This class shall include the rices known commercially as Japan, and may include not more than 10 per cent of whole kernels of rice of any other class or classes. This class shall be divided into two sub-classes designated as (a) Japan brown rice, and (b) California Japan brown rice.

**SUBCLASS (A) JAPAN BROWN RICE**

This subclass shall include all rices known commercially as Japan possessing the characteristics of rice of this class as grown east of the Rocky Mountains.

*Grade requirements for classes Blue Rose and Early Prolific brown rice and the subclass Japan brown rice*

United States grade	Maximum limits of—										
	Cereal grains, seeds, mud lumps, and heat-damaged kernels (number in 500 grams)				Paddy grains	Red rice	Damage other than heat	Chalky kernels	Broken kernels		Other rices
	Cereal grains	Seeds	Heat-damaged kernels	Mud lumps					Total	Through No. 6½ sieve	
No.	No.	No.	No.	%	%	%	%	%	%	%	
Extra fancy . . .	0	2	0	1	0.2	0.5	1	1.5	5	1	1
Fancy . . . . .	1	5	1	2	0.4	1.0	3	2.5	10	2	2
Choice . . . . .	5	10	5	5	1.0	3.0	5	5.0	15	3	4

Sample grade: Sample grade shall be brown rice of the class Blue Rose or Early Prolific or the subclass Japan, respectively, which does not come within the requirements for any of the grades from Extra Fancy to Choice, inclusive, or which has any commercially objectionable foreign odor, or is musty or sour, or is heating, or hot, or is of a badly damaged or badly stained appearance, or is otherwise of distinctly low quality, or contains more than 0.1 per cent of foreign material excepting paddy grains, other cereal grains, seeds, and mud lumps, or contains more than 14.5 per cent of moisture.

## SUBCLASS (B) CALIFORNIA-JAPAN BROWN RICE

This subclass shall include all rices known commercially as Japan possessing the characteristics of rice of this class as grown west of the Great Plains area of the United States.



*Grade requirements for the subclass California-Japan brown rice*

United States grade	Maximum limits of—										
	Cereal grains, seeds, mud lumps, and heat-damaged kernels (number in 500 grams)				Paddy grains	Red rice	Damage other than heat	Chalky kernels	Broken kernels		Other rices
	Cereal grains	Seeds	Heat-damaged kernels	Mud lumps					Total	Through No. 6½ sieve	
	No.	No.	No.	No.	%	%	%	%	%	%	
Fancy.....	1	25	1	1	0.2	0.2	0.3	3	10	1	0.1
1.....	3	50	3	3	.2	.4	.7	6	10	2	.2
2.....	5	75	5	5	.4	.7	1.5	10	15	3	.4

Sample grade: Sample grade shall be brown rice of the subclass California-Japan brown rice which does not come within the requirements for any of the grades from Fancy to No. 2, inclusive, or which has any commercially objectionable foreign odor, or is musty or sour, or is heating, or hot, or is of a badly damaged or badly stained appearance, or is otherwise of distinctly low quality, or contains more than 0.1 per cent of foreign material excepting paddy grains, other cereal grains, seeds, and mud lumps, or contains more than 15 per cent of moisture.

**GRADES FOR MIXED BROWN RICE**

**Mixed brown rice.**—Mixed brown rice shall be a mixture of any two or more of Classes I, II, III, IV, V, VI, VII, and VIII which does not meet the requirements of any one of such classes.

Mixed brown rice shall be graded according to each of the grade requirements common to the class or subclass of brown rice which predominates over each other class or subclass in the mixture, except that all of the grade requirements in any class as to the maximum percentages of other rices shall be disregarded. The grade designation of mixed brown rice shall include, successively, in the order named, the name of the grade or the number thereof, the word "mixed," and, in the order of its predominance, the name and approximate percentage of each class or subclass of brown rice which constitutes 10 per cent or more of the mixture, but if only one class or subclass exceeds 10 per cent of the mixture the name and approximate percentage of that class or subclass shall be added to the grade designation, followed by the name and approximate percentage of at least one other class or subclass.

**GRADES FOR WEEVILY BROWN RICE**

**Weevily brown rice.**—Weevily brown rice shall be all brown rice which is infested with live weevils or other insects injurious to stored rice.

Weevily brown rice shall be graded and designated according to the grade requirements of the grade applicable to such rice if it were not

weevily, and there shall be added to and made a part of such grade designation the word "Weevily."

#### DEFINITIONS

**Basis of determination.**—All determinations shall be upon the basis of the lot of rice as a whole.

**Percentages.**—Percentages, except in the case of moisture, shall be percentages ascertained by weight.

**Percentage of moisture.**—Percentage of moisture shall be that ascertained by the moisture tester and the method of use thereof described in Bulletin 1375, dated February, 1926, issued by the United States Department of Agriculture, Bureau of Agricultural Economics, except that the flame shall be extinguished when the thermometer registers 200° C., or ascertained by any device and method giving equivalent results.

**No. 6½ sieve.**—A metal sieve perforated with round holes six-and-one-half sixty-fourths inch in diameter.

**Damaged kernels.**—Damaged kernels shall be kernels and pieces of kernels of brown rice which have been distinctly damaged by water, insects, or by any other means. Sound double and sound broken kernels shall not be considered damaged kernels.

**Heat-damaged kernels.**—Heat-damaged kernels shall be kernels and pieces of kernels of brown rice which have been distinctly discolored by external heat or as a result of heating caused by fermentation.

**Cereal grains.**—Cereal grains shall include barley, wheat, rye, emmer, spelt, einkorn, corn, grain sorghums, and oats, and shall not include buckwheat, flaxseed, and wild oats.

**Seeds.**—Seeds shall be grains, kernels, or seeds, either whole or broken, of any plant other than rice or cereal grains.

**Red rice.**—Red rice shall be kernels or pieces of kernels of brown rice which are distinctly red in color or have any appreciable amount of red bran thereon.

**Broken kernels.**—Broken kernels shall be split kernels of brown rice and pieces of kernels which are less than three-fourths of the length of the perfect kernels.

**Chalky kernels.**—Chalky kernels shall be kernels and pieces of kernels of brown rice one-half or more of which is chalky.

**Mud lumps.**—Mud lumps shall be lumps of dried mud which will not pass through a No. 6½ sieve. Mud lumps which will pass through a No. 6½ sieve shall function in grading only as foreign material.

**Paddy grains.**—Paddy grains shall be kernels of rice from which the hulls have not been removed.

## UNITED STATES STANDARDS FOR ROUGH RICE

For the purposes of the United States standards for rough rice:

**Rough rice.**—Rough rice shall be rice grown in continental United States which contains not less than 50 per cent of kernels of rice from which the hulls have not been removed, and which may contain not more than 50 per cent of matter other than rice and not more than 10 per cent of cereal grains of a kind or kinds other than rice.

### HONDURAS ROUGH RICE (CLASS I)

This class shall include the rices known commercially as Honduras and Mortgage Lifter, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

### EDITH ROUGH RICE (CLASS II)

This class shall include the rice known commercially as Edith, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

### FORTUNA ROUGH RICE (CLASS III)

This class shall include the rice known commercially as Fortuna, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

### CAROLINA ROUGH RICE (CLASS IV)

This class shall include the rices known commercially as Carolina and Storm Proof, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

**LADY WRIGHT ROUGH RICE (CLASS V)**

This class shall include the rice known commercially as Lady Wright, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

**BLUE ROSE ROUGH RICE (CLASS VI)**

This class shall include the rices known commercially as Blue Rose, Greater Blue Rose, and Improved Blue Rose, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

**EARLY PROLIFIC ROUGH RICE (CLASS VII)**

This class shall include the rice known commercially as Early Prolific, and may include not more than 10 per cent of whole kernels of rice of any other class or classes.

**JAPAN ROUGH RICE (CLASS VIII)**

This class shall include the rices known commercially as Japan, and may include not more than 10 per cent of whole kernels of rice of any other class or classes. This class shall be divided into two subclasses designated as (a) Japan rough rice, and (b) California-Japan rough rice.

**SUBCLASS (A) JAPAN ROUGH RICE**

This subclass shall include all rices known commercially as Japan possessing the characteristics of rice of this class as grown east of the Rocky Mountains.

*Grade requirements for the classes Honduras, Edith, Fortuna, Carolina, Lady Wright, Blue Rose, and Early Prolific rough rice, and for the subclass Japan rough rice*

United States grade No. <sup>1</sup>	Maximum limits of—						
	Damaged kernels		Red rice	Foreign material and finely broken kernels			Rice of other classes
	Total	Heat damage		Sepa- rable	Inseparable <sup>1</sup>		
					Mud lumps	Cereal grains	
<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	
1-----	2	0.0	0.5	2	0.0	0.0	1
2-----	4	.1	3.0	4	.1	.1	2
3-----	7	.2	6.0	7	.2	.2	4
4-----	10	.3	10.0	10	.3	.3	6
5-----	15	.4	20.0	15	.5	.5	10
6-----	15	.5	30.0	15	1.0	1.0	10

Sample grade: Sample grade shall be rough rice of the class Honduras, or Edith, or Fortuna, or Carolina, or Lady Wright, or Blue Rose, or Early Prolific, or the subclass Japan, respectively, which does not come within the requirements for any of the grades from No. 1 to No. 6, inclusive, or which has any commercially objectionable foreign odor, or is sour, heating, or hot, or is otherwise of distinctly low quality. The rough rice in each grade above sample grade shall be cool.

<sup>1</sup> For special grade designations for weevily, damp, wet, seedy, very seedy, mud-dragged, stained, and musty rough rice see specifications given on pp. 38 to 42, inclusive.

## SUBCLASS (B) CALIFORNIA-JAPAN ROUGH RICE

This subclass shall include all rices known commercially as Japan possessing the characteristics of rice of this class as grown west of the Great Plains area of the United States.



*Grade requirements for the subclass California-Japan rough rice*

United States grade No. <sup>1</sup>	Maximum limits of—						
	Damaged kernels		Red rice	Foreign material and finely broken kernels			Rice of other classes
	Total	Heat damage		Sepa- rable	Inseparable <sup>1</sup>		
					Mud lumps	Cereal grains	
<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	
1.....	0.2	0.0	0.1	2	0.0	0.0	0.1
2.....	.4	.1	.2	4	.1	.1	.2
3.....	.7	.2	.5	7	.2	.2	.4
4.....	1.0	.3	1.0	10	.3	.3	.6
5.....	1.5	.4	2.0	15	.5	.5	1.0
6.....	2.0	.5	5.0	20	1.0	1.0	1.0

Sample grade: Sample grade shall be rough rice of the subclass California-Japan which does not come within the requirements for any of the grades from No. 1 to No. 6, inclusive, or which has any commercially objectionable foreign odor, or is sour, heating, or hot, or is otherwise of distinctly low quality. The rough rice in each grade above sample grade shall be cool.

<sup>1</sup> For special grade designations for weevily, damp, wet, seedy, very seedy, mud-dragged, stained, and musty rough rice see specifications given on pp. 38 to 42, inclusive.

**GRADES FOR MIXED ROUGH RICE**

*Mixed rough rice.*—Mixed rough rice shall be a mixture of any two or more of Classes I, II, III, IV, V, VI, VII, and VIII which does not meet the requirements of any one of such classes.

Mixed rough rice shall be graded according to each of the grade requirements common to the class or subclass of rough rice which predominates over each other class or subclass in the mixture, except that all of the grade requirements in any class as to the maximum percentages of other rices shall be disregarded. The grade designation of mixed rough rice shall include, successively, in the order named, the number of the grade, the word "mixed," and, in the order of its predominance, the name and approximate percentage of each class or subclass of rough rice which constitutes 10 per cent or more of the mixture; but if only one class or subclass exceeds 10 per cent of the mixture the name and approximate percentage of that class or subclass shall be added to the grade designation, followed by the name and approximate percentage of at least one other class or subclass.

**GRADES FOR DAMP AND WET ROUGH RICE****DAMP ROUGH RICE**

In the case of rice other than of the subclass California-Japan rough rice all rough rice containing more than 14 per cent but not more than 15.5 per cent of moisture shall be considered damp.

In the case of rice of the subclass California-Japan rough rice all rough rice containing more than 15 per cent but not more than 16 per cent of moisture shall be considered damp.

Damp rough rice shall be graded and designated according to the grade requirements of the grade applicable to such rice if it were not damp, and there shall be added to and made a part of such grade designation the word "Damp."

#### WET ROUGH RICE

In the case of rice other than of the subclass California-Japan rough rice all rough rice containing more than 15.5 per cent but not more than 17 per cent of moisture shall be considered wet.

In the case of rice of the subclass California-Japan rough rice all rough rice containing more than 16 per cent but not more than 17 per cent of moisture shall be considered wet.

Wet rough rice shall be graded and designated according to the grade requirements of the grade applicable to such rice if it were not wet, and there shall be added to and made a part of such grade designation the word "Wet."

**NOTE.**—All rough rice containing more than 17 per cent of moisture shall be considered of low quality and shall be graded "Sample grade."

#### GRADES FOR SEEDY AND VERY SEEDY ROUGH RICE

The determination of whether rough rice is seedy, very seedy, or sample grade on account of seeds shall be made after the removal of separable foreign material.

## SEEDY ROUGH RICE

If, after the removal of separable foreign material, in the case of rice other than of the subclass California-Japan rough rice, rough rice contains more than 0.1 per cent but not more than 0.5 per cent of weed seeds it shall be considered seedy.

If, after the removal of separable foreign material, in the case of rice of the subclass California-Japan rough rice, rough rice contains more than 0.5 per cent but not more than 1.5 per cent of weed seeds it shall be considered seedy.

Seedy rough rice shall be graded and designated according to the grade requirements of the grade applicable to such rice if it were not seedy, and there shall be added to and made a part of such grade designation the word "Seedy."

## VERY SEEDY ROUGH RICE

If, after the removal of separable foreign material, in the case of rice other than of the subclass California-Japan rough rice, rough rice contains more than 0.5 per cent but not more than 1 per cent of weed seeds it shall be considered very seedy.

If, after the removal of separable foreign material, in the case of rice of the subclass California-Japan rough rice, rough rice contains more than 1.5 per cent but not more than 3 per cent of weed seeds it shall be considered very seedy.

Very seedy rough rice shall be graded and designated according to the grade requirements of the grade applicable to such rice if it were not very seedy, and there shall be added to and made a part of such grade designation the words "Very Seedy."

NOTE.—If, after the removal of separable foreign material, in the case of rice other than of the subclass California-Japan rough rice, rough rice contains more than 1 per cent of weed seeds it shall be considered of low quality and shall be graded "Sample grade." If, after the removal of separable foreign material, in the case of rice of the subclass California-Japan rough rice, rough rice contains more than 3 per cent of weed seeds it shall be considered of low quality and shall be graded "Sample grade."

#### GRADES FOR WEEVILY ROUGH RICE

**Weevily rough rice.**—Weevily rough rice shall be all rough rice which is infested with live weevils or other insects injurious to stored rice.

Weevily rough rice shall be graded and designated according to the grade requirements of the grade applicable to such rice if it were not weevily, and there shall be added to and made a part of such grade designation the word "Weevily."

#### GRADES FOR STAINED, MUD-DRAGGED, AND MUSTY ROUGH RICE

##### STAINED ROUGH RICE

Stained rough rice shall be rough rice which has been distinctly discolored by climatic conditions or in any other manner.

Stained rough rice shall be graded and designated according to the grade requirements of

the grade applicable to such rice if it were not stained, and there shall be added to and made a part of such grade designation the word "Stained."

#### MUD-DRAGGED ROUGH RICE

Mud-dragged rough rice shall be rough rice in which there are more than 2 per cent of kernels with a distinct amount of mud clinging to them.

Mud-dragged rough rice shall be graded and designed according to the grade requirements of the grade applicable to such rice if it were not mud-dragged, and there shall be added to and made a part of such grade designation the word "Mud-dragged."

#### MUSTY ROUGH RICE

Musty rough rice shall be rough rice which has an unmistakable musty odor.

Musty rough rice shall be graded and designated according to the grade requirements of the grade applicable to such rice if it were not musty, and there shall be added to and made a part of such grade designation the word "Musty."

#### MILLING QUALITY

Milling quality shall be based on the value of the rough rice for milling purposes. The test for milling quality shall be determined by use of the Smith shelling device, described in mimeograph circular USGSA-GI, No. 34, dated August, 1925, issued by the Bureau of Agricul-

tural Economics, United States Department of Agriculture, or as determined by any device or method giving equivalent results.

Milling quality shall be determined as prime milling quality, good milling quality, medium milling quality, fair milling quality, ordinary milling quality, or low milling quality. The milling quality so determined and stated shall be added to the grade designation.

#### DEFINITIONS

**Basis of determinations.**—Each determination of general appearance, temperature, odor, moisture, separable foreign material and finely broken kernels, milling quality, mud-dragged, and insects injurious to stored rice shall be on the basis of the lot of rice as a whole. Each determination of red rice, damaged kernels, and other classes shall be upon the basis of the rice after shelling. All other determinations shall be upon the basis of the rice when free from separable foreign material and finely broken kernels and before shelling.

**Percentages.**—Percentages, except in the case of moisture, shall be percentages ascertained by weight.

**Percentage of moisture.**—Percentage of moisture shall be that ascertained by the moisture tester and the method of use thereof described in Bulletin No. 1375, dated February, 1926, issued by the United States Department of Agriculture, Bureau of Agricultural Economics, except that the flame shall be extinguished when



the thermometer registers 200° C., or ascertained by any device and method giving equivalent results.

**Damaged kernels.**—Damaged kernels shall be kernels and pieces of kernels of rough rice which have been distinctly damaged by water, insects, or by any other means. Sound broken kernels and kernels of which the hulls only have been damaged shall not be considered as damaged kernels.

**Heat-damaged kernels.**—Heat-damaged kernels shall be kernels and pieces of kernels of rough rice which have been distinctly discolored by external heat or as a result of heating caused by fermentation.

**Separable foreign material and finely broken kernels.**—Separable foreign material and finely broken kernels shall be all matter other than rice which will not pass through a No. 12 sieve and all kernels and pieces of kernels of rough rice and all foreign matter which will pass through a No. 6½ sieve.

**No. 12 sieve.**—A metal sieve perforated with round holes twelve sixty-fourths inch in diameter.

**No. 6½ sieve.**—A metal sieve perforated with round holes six and one-half sixty-fourths inch in diameter.

**Mud lumps.**—Mud lumps shall be lumps of dried mud which will pass through a No. 12 sieve but which will not pass through a No. 6½ sieve. Mud lumps which will not pass through a No. 12 sieve or which will pass through



a No. 6½ sieve shall function in grading only as "separable foreign material and finely broken kernels."

**Cereal grains.**—Cereal grains shall include barley, rye, wheat, emmer, spelt, einkorn, corn, grain sorghums, and oats, and shall not include buckwheat, flaxseed, and wild oats. Cereal grains which will not pass through a No. 12 sieve or which will pass through a No. 6½ sieve shall function in grading only as "separable foreign material and finely broken kernels."

**Weed seeds.**—Weed seeds shall be grains, kernels, or seeds, either whole or broken, of any plant other than rice or other cereal grains. Weed seeds which will not pass through a No. 12 sieve or which will pass through a No. 6½ sieve shall function in grading only as "separable foreign material and finely broken kernels."

**Red rice.**—Red rice shall be whole or broken kernels of rice of which the bran is distinctly red or pink in color.

## IMPORTANT FEATURES OF GRADING RICE

### THE SAMPLING OF RICE

The obtaining of a representative sample is essential to the determination of the true grade of a given lot of rice. If the sample obtained is not representative no amount of care in making determinations for the grading factors will establish the true grade of the rice sampled. Consequently, great care should be taken in sampling in order that the sample on which the grade of the rice is to be based shall truly represent the rice sampled.

The sample should be approximately 2 quarts in size. If the time to elapse between the drawing of the sample and the determination of grade would permit of such change in the condition of the sample as to affect the grade, at least  $1\frac{1}{8}$  pints should be inclosed in an air-tight container and the remainder, if any, in a clean cloth sack.

In case of rice in sacks, samples shall be drawn from as many individual sacks selected at random as will enable the sampler to procure an average and representative sample of the entire lot. In case a lot is of such size or is stacked in such a manner that a representative sample can not be obtained, no official inspection of the rice should be made until a representative portion of it is accessible for sampling.

In the case of bulk rough rice in a carload lot, or in a wagon, at least five probes (with a

double-shell compartment trier 60 inches long, or one giving equivalent results), and as many more as may be necessary, in the discretion of the sampler, shall be taken from the rice in different parts of the car or wagon, as the case may be.

In case of bulk rough rice in a canal boat, barge, ship, or other vessel at least five probes (with a double-shell compartment trier, or one giving equivalent results), and as many more as may be necessary, in the discretion of the sampler, shall be taken at points through each hatch or opening in the deck, or may be drawn from the spout or on the belt or other conveyor from the vessel if taken in such a way as to be representative of the entire lot or parcel.

In case of bulk rough rice being loaded aboard a canal boat, barge, ship, or other vessel, the sample may be taken from the spout or on the belt or other conveyor to the vessel if taken in such a way as to be representative of the entire lot or parcel.

Samples drawn from individual sacks should either be kept in separate containers until taken to the inspection office or should be compared by the sampler as drawn to see that the lot being sampled is uniform and regular in quality.

In case it shall appear that a material portion of a lot or parcel of rice is in any manner distinctly inferior to the remainder of the lot or parcel, a separate sample otherwise complying with these instructions shall be taken from such portion and from the remaining portion. There

shall be filed with such sample a statement showing the estimated quantity of each portion of the rice from which each sample was taken.

### SAMPLING DEVICES

#### MILLED AND BROWN RICE SACK TRIER

For obtaining a representative sample from sacked milled rice or sacked brown rice the use of the trier shown in Figure 1 is recommended.

The use of such a trier makes it possible for the sampler to note the condition of rice in the centers of the sacks. To obtain a sample from the center of the pocket the core is inserted in the trier, the trier is pushed into the sack, the core is removed, and the trier is allowed to fill with rice.

When the rice in a sack is uniformly dry and of good quality it is not so necessary to examine the center of the pocket, but if the rice has been excessively damp it is highly essential that the quality of the rice in the center of the pocket be determined before placing a grade on the lot.

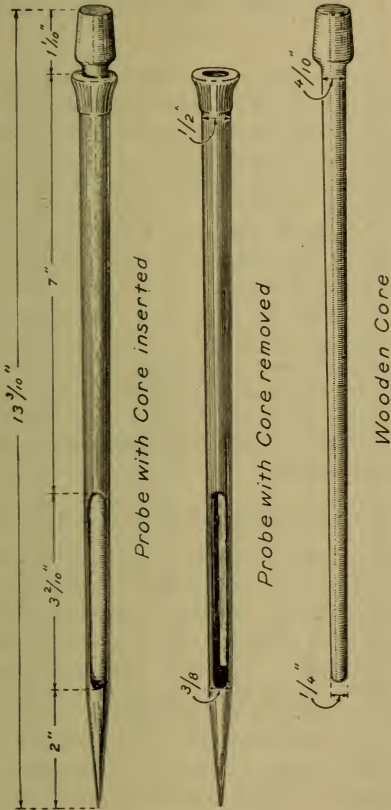


FIG. 1.—Milled rice sack trier (probe). Used for obtaining a representative sample from sacks (pockets) of milled and brown rice.

## BULK RICE TRIER (PROBE) AND SAMPLING CANVAS

For obtaining a representative sample from a carload of bulk rice the use of the double tube, separate compartment grain trier (probe) shown in Figure 2 is recommended.

The use of such a trier makes it possible for the sampler to note any unevenness in loading and to ascertain the approximate location and quantity of any mixture of rice or of dirty, heating, or damp spots, etc., found in any part of the rice. To assist in doing this it is advisable to use a canvas 5 by 2 feet in dimensions on which to empty the grain from the trier. The grain should be emptied lengthwise on the canvas, each separate trierful apart from the others, so that the grain from each compartment can be noted separately.

## SAMPLE DIVIDER (BOERNER SAMPLER)

After a representative sample of the lot or parcel of rice to be graded is obtained, it is usually necessary to reduce its size considerably, in order that the grade may be determined by careful analysis. To reduce the size of a sample of rice containing broken kernels or foreign substances of different specific gravity or size than of the rice with which they are mixed, and at the same time obtain a sample as representative as the original, is hardly possible except by mechanical means.

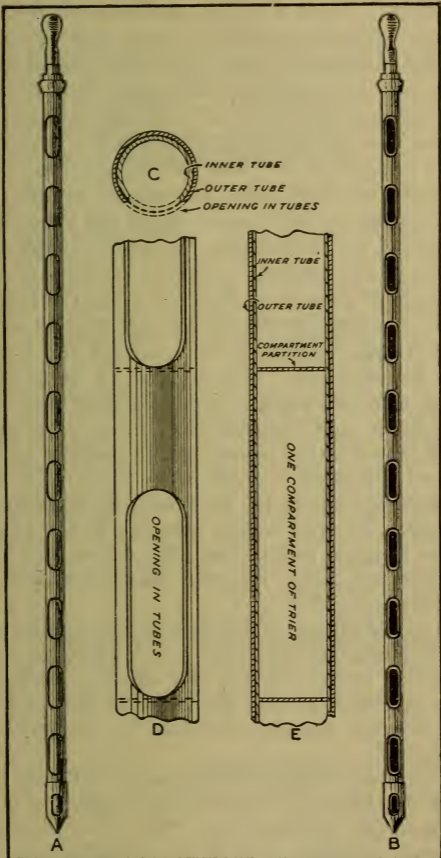


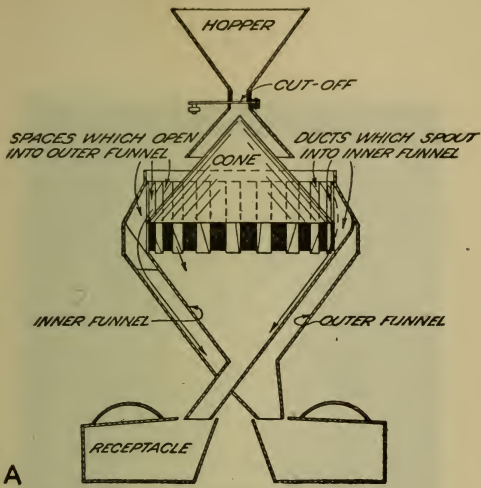
FIG. 2.—Bulk rice trier (probe). Double-tubed, separate-compartment trier (probe), recommended by the Department of Agriculture for sampling bulk rough rice. A, Trier closed; B, trier open; C, cross section showing double tubes; D, sectional view; and E, longitudinal view showing compartments

Figure 3 shows a device, generally referred to as the "Boerner sampler," which will divide a sample of milled or brown rice into smaller portions and still maintain the proper proportions for the various factors of the original sample. In the operation of this device the rice is placed in a hopper at the top of the machine and released, when it passes through an opening at the bottom of the hopper, down the sides of a cone, the point of which is directly under the center of the opening. Around the base of the cone are 36 pockets or openings. The rice falling down the sides of the cone is cut into 36 separate streams, which, a little farther on, merge into two streams. Streams Nos. 1, 3, 5, etc., unite into one stream which empties into one receptacle, and streams Nos. 2, 4, 6, 8, etc., unite into another stream which empties into a second receptacle. Each time the rice is put through the device the lot is split approximately in half. The rice falling into one of the receptacles is again put through the device, and this is repeated until the size sample desired is obtained.

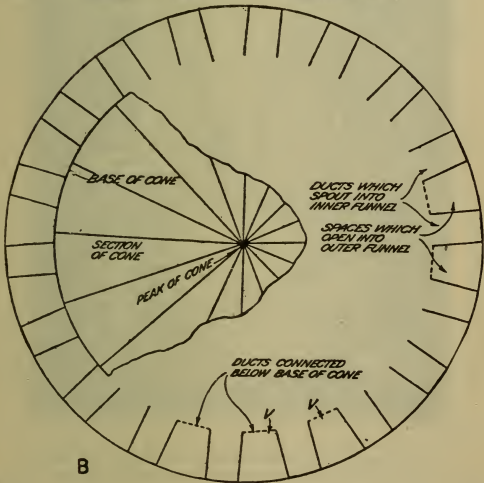
A modified form of the Boerner sampler is used for reducing the size of a sample of rough rice. Figure 4 shows the modified Boerner sampler. The operation of this device is the same as for the Boerner sampler described in the previous paragraph.

The Boerner sampler illustrated in Figure 3 is fully described in United States Department of Agriculture Bulletin No. 287. The modified Boerner sampler is fully described in United States Department of Agriculture Bulletin No. 857.





A



B

FIG. 3.—Sample divider (Boerner sampler) used for sampling milled and brown rice. A, vertical cross section of device showing paths taken by the material in passing from the hopper to the containers; B, cross section of the device at the base of the cone

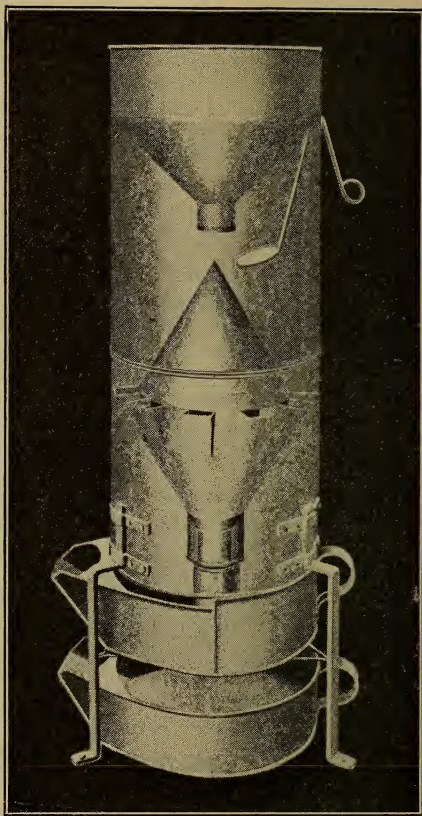


FIG. 4.—Modified Boerner sampler. For use in obtaining a representative portion from a larger sample of rough rice for analyses purposes

## METHOD OF MAKING MOISTURE TESTS

Owing to the numerous methods of making moisture determinations and the wide variations in the results obtained by the different methods the tester and method described in Bulletin 1375 of the Bureau of Agricultural Economics, United States Department of Agriculture, have been designated as the standard on which the grades are based. This in no way precludes the use of other methods of making moisture determinations, so long as the results are corrected to conform to those secured by the standard method specified. Figure 5 represents a sectional view of the official standard moisture tester.

In making moisture tests, use the quantities of oil and grain and extinguish the flame as listed in the following table of specifications:

Kind of grain	Oil in flask	Weight of grain in flask	Extinguish the flame at—
	<i>C. c.</i>	<i>Grams</i>	<i>° C.</i>
Head rice (milled).....	<sup>1</sup> 150	100	200
Second head rice.....	<sup>1</sup> 150	100	200
Screenings rice.....	<sup>2</sup> 150	100	200
Brewers' rice.....	<sup>2</sup> 150	100	200
Brown rice.....	<sup>1</sup> 150	100	200
Rough rice.....	150	100	200
Wheat.....	150	100	180
Shelled corn.....	150	100	190
Oats.....	150	<sup>3</sup> 50	195
Rye.....	150	100	175
Grain sorghums.....	150	100	190
Barley.....	150	100	190
Flaxseed.....	150	100	175

<sup>1</sup> Use glass wool pad 2 inches in diameter and one-fourth inch thick in bottom of flask.

<sup>2</sup> Use double-walled flask (Dept. of Agr. Bulletin No. 1375).

<sup>3</sup> Use special graduate which is one-half of the volume of the regular graduate; however, the regular graduate may be used by doubling the moisture test reading.

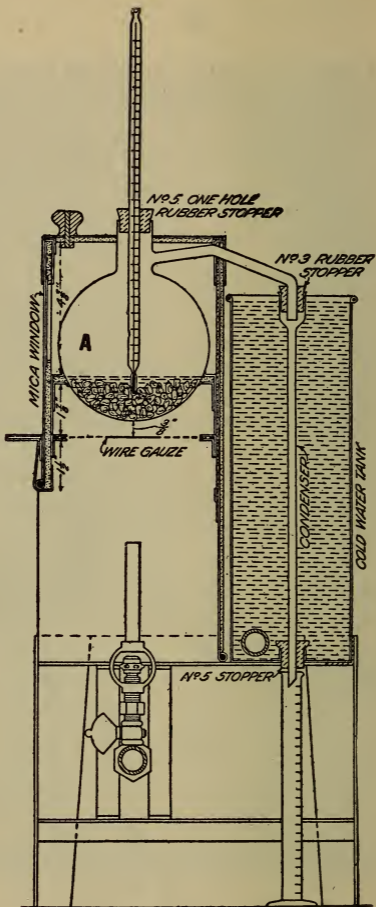


FIG. 5.—Moisture tester. Sectional view of the official moisture tester, showing the various parts properly connected for use; A, distillation flask in position three-eighths of an inch above the wire gauze

Special points for consideration:

(1) Install the moisture tester in a place where it will not be exposed to strong air currents.

(2) The standard tester is equipped for heating with illuminating gas.

(3) Keep the wire gauze with asbestos center in good condition and so adjusted that the flame plays directly in the center of the asbestos.

(4) Place the flask so that the bottom of the flask is not less than three-eighths of an inch above the wire gauze.

(5) See that the column of mercury in the thermometer is continuous; if broken it should be shaken down.

(6) Thoroughly mix the sample before weighing for tests; and unless the test is to be made immediately upon its arrival in the office, place in air-tight container.

(7) Make tests in duplicate, and if duplicates vary over three-tenths of 1 per cent make another test.

(8) Adjust the thermometers so that four-fifths of the mercury bulb is submerged in the grain and oil after the grain has been placed in the flask. (See to the adjustment each time. Do not guess.)

(9) Use correctly graduated thermometers and graduates.

(10) Do not use mushy rubber stoppers as they absorb some of the moisture that should pass into the graduates.

(11) Clean and dry each graduate before using for a test. (Do not let them show any moisture in the bottom or along the sides.)

(12) Do not use oil directly from the previous test. Empty used flasks into a large storage can and never directly into the oil-measuring device.

(13) Keep a good circulation of cold water through the condenser tank.

(14) Adjust the heating apparatus so that the required temperature is reached in 20 minutes. A longer time will give results too low and a shorter time, too high.

(15) If the moisture content of the sample is high so that there is a tendency to boil over, lower the flame until a considerable portion of the water is distilled over.

(16) Cut off the heat at the exact temperature prescribed for each grain.

(17) After the flame is extinguished a slight gradual rise in temperature is to be expected. A sudden increase or sudden decrease in temperature of several degrees indicates, that the flame was too intense during the latter part of the heating, and the test should be repeated.

(18) Do not remove covers, nor remove thermometers until the temperature recedes to 160° C.

(19) After the temperature has fallen to 160° C. or lower, disconnect thermometer and then the delivery tube.

(20) Read the percentage of moisture in the graduated cylinder after all the drops clinging to the sides of the graduates have been shaken down. The reading is taken beneath the layer of oil on top of the water.

(21) Results of tests need not be expressed more closely than one-tenth of 1 per cent.

(22) If the water which distills over is discolored, the substance has evidently been burned and the test should be repeated.

(23) When machine is not in use keep thermometers connected in the flasks and the flasks connected with the distilling tubes in the same manner as for making a test.

(24) Before making a test in a new flask, or before using a machine that has not been in use for a 24-hour period, a test should be made on a preliminary sample so that all the flasks will be uniform in condition.

(25) Place scales on a firm support and see that they are in balance before making a weighing.

(26) The specific directions given above and in Department of Agriculture Bulletin No. 1375 for making tests do not apply to modified forms of testers.



**DETERMINATION OF MILLING QUALITY OF ROUGH RICE****SMITH SHELLING DEVICE**

The Smith shelling device illustrated in Figure 6 is specified as the standard method for making shellings of rough rice for the purpose of determining its milling quality. The percentage of admixtures of red rice, damaged kernels, and other quality factors in rough rice can also be determined more readily after the hulls have been removed with the shelling device.

The Smith shelling device is fully described in mimeographed circulars USGSA-GI, Nos. 34 and 35, issued by the Bureau of Agricultural Economics, United States Department of Agriculture.

In making shellings of rough rice it is important that the following method be used:

Use only samples which have been freshly drawn or samples which have been kept in airtight containers for only a short length of time. The hardness of the kernels in a lot will not be correctly shown by a shelling made of a sample of rough rice which has been allowed to remain in the open air or which has been stored in a paper sack or similar container.

Use a 50-gram portion of rough rice for the shelling. This portion should be "cut" from the sample by the use of the modified Boerner sampler illustrated on page 54. Great care should be taken to see that this portion is accurately weighed.



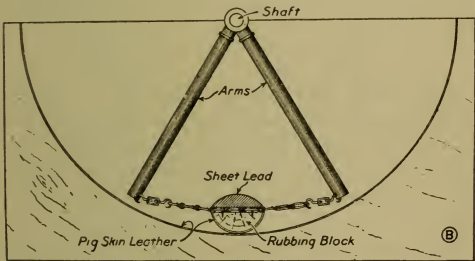
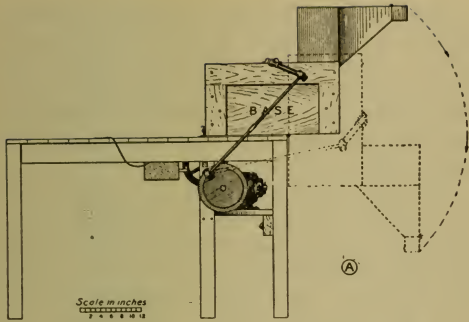


FIG. 6.—Smith shelling device. Used for rubbing the hulls off from the kernels in samples of rough rice to determine its milling quality. (A) The device assembled on a table. The dotted lines show the position of the device while it is being emptied. (B) Crosssection of the base illustrating the hook up of the rubbing block

Place the 50-gram portion in the shelling device and set the machine in motion by starting the motor. The device is equipped with an automatic cut-off switch which stops the machine after the rice has received 100 rubs. Each portion should receive 300 rubs when testing the rice for milling quality.

When the machine stops at the end of 300 rubs the rubbed rice is removed by dumping the device down over the end of the table and brushing the hulls and rice into a pan fastened to the end of the hopper. Care should be used to see that all of the rice and hulls in the "shelling" are brushed into this pan, leaving nothing in the device and without losing any of the kernels or hulls.

#### BATES LABORATORY ASPIRATOR

The Bates laboratory aspirator is recommended for use in separating the loose hulls from the "rubbed" rice. This apparatus makes it possible to remove the loose hulls from the shelling without the loss of the finely broken particles of rice.

After the loose hulls have been removed from the shelling the remaining portion may be analyzed for whole and broken kernels, red rice, and damaged kernels, or any other factor which is more readily determined with the hulls removed.

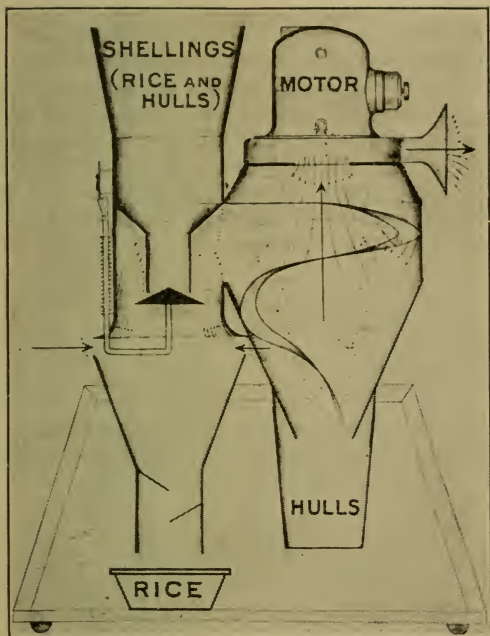


FIG. 7.—Bates laboratory aspirator. Used for removing the hulls from rubbed samples (shellings) of rough rice

#### SIEVING SHELLINGS OF ROUGH RICE

After the loose hulls have been removed from a "shelling" of rough rice the smaller broken kernels can be removed from the rice by the use of a Black-Shea sieving device. (See description of the device on p. 66.)

For this purpose a No.  $6\frac{1}{2}$  sieve should be placed in the upper deck and a No.  $5\frac{1}{2}$  sieve should be placed in the lower deck of the device. The machine should be set in motion, the shelling should then be placed in the hopper, and the machine allowed to run until the rice has passed over or through the sieves. The larger pieces of broken kernels which are not removed in sieving can be readily removed from the whole kernels by hand picking.

**METHOD OF SIEVING RICE TO DETERMINE  
BROKEN KERNELS AND FOREIGN MATERIAL**

The standards for rice specify that the percentage of broken kernels present in each milled and brown rice, and the percentage of foreign material and finely broken kernels in rough rice, shall be determined by the use of certain specified sieves. The sieves are described as follows:

**No. 5½ sieve.**—A metal sieve perforated with round holes five and one-half sixty-fourths inch in diameter.

**No. 6 sieve.**—A metal sieve perforated with round holes six sixty-fourths inch in diameter.

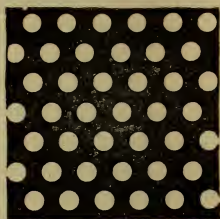
**No. 6½ sieve.**—A metal sieve perforated with round holes six and one-half sixty-fourths inch in diameter.

**No. 12 sieve.**—A metal sieve perforated with round holes twelve sixty-fourths inch in diameter.

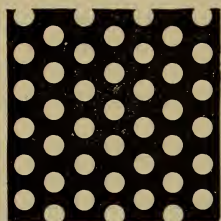
It is essential that the dimensions of the perforations of the sieves used be exactly as stated above. A slight variation in the dimensions materially influences the percentage of matter which will pass through the sieve. To secure the exact size it is necessary that the perforations be cut with dies especially made for the purpose. Sieves made from tin or galvanized iron with an ordinary punch will not give accurate results. The shape and arrangement of the perforations are shown in Figure 8.



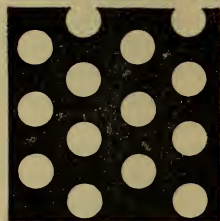
NO. 5 1/2



NO. 6



NO. 6 1/2



NO. 12

FIG. 8.—Illustrating the perforations (full size) for the No. 5 1/2, No. 6, No. 6 1/2, and No. 12 sieves specified in the official standards for rice

#### BLACK-SHEA SIEVING DEVICE

To obtain uniform results in sieving it is essential that the sievings be made with a mechanical sieving device. The Black-Shea sieving device illustrated in Figure 9 has been adopted as the standard apparatus for making sievings in connection with the grading of rice in accordance with the specifications contained in the United States standards for milled, brown, and rough rice.

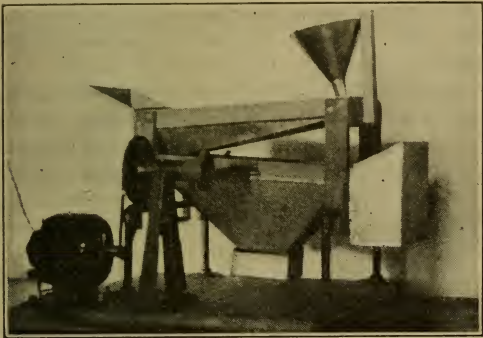


FIG. 9.—Black-Shea sieving device, operated by a motor, adopted by the United States Department of Agriculture in connection with the grading of milled rice, brown rice, and rough rice

The essential features of the Black-Shea sieving device are: A hopper which feeds the rice onto the sieve, in which the rate of flow of the rice onto the top sieve is controlled by an adjustable opening or gate at the bottom of the hopper; a movable sieve frame holding two sieves; hoppers and containers located at the end and under the sieves to catch the material which passes over or through the sieves as the case may be; and an electric motor to give the sieve frame containing the sieves a side-shake motion.

#### DETERMINING BROKEN KERNELS IN MILLED RICE

The No. 5, No. 5½, and No. 6 sieves are specified in the standards for determining the broken kernel content in milled rice.

A representative portion of approximately 50 grams of the sample being graded should be used for making the determination. For reliable

results the 50-gram portion must be obtained from the original sample by means of the Boerner sampler.

Place the 50 grams of rice to be tested in the receiving hopper of the Black-Shea sieving device and start the motor. Permit the machine to operate until all of the rice has either passed over or through the sieves. Usually some of the larger pieces of broken kernels will become wedged in the perforations.

The broken kernels of rice which pass through the sieves should be removed and weighed. Next the kernels that are wedged in the perforations should be removed from the sieves and returned to the rice which passed over the sieve in which they were found.

#### DETERMINING BROKEN KERNELS IN BROWN RICE

The No.  $6\frac{1}{2}$  sieve is specified in the standards for determining the broken kernel content in brown rice.

A representative portion of approximately 50 grams of the sample being graded should be tested for broken kernel content by means of the Black-Shea sieving device.

The methods for obtaining a representative portion of 50 grams and of making the sieving are the same as that described in the previous paragraph for the determination of broken kernels in milled rice.

#### DETERMINING FOREIGN MATERIAL AND FINELY BROKEN KERNELS IN ROUGH RICE

The No.  $6\frac{1}{2}$  and the No. 12 sieves are specified in the standards for determining the foreign material and finely broken kernel content in rough rice.



A representative portion of 100 grams of the sample being graded should be tested by means of the Black-Shea sieving device. For reliable results the 100-gram portion should be obtained from the original sample by means of the Modified Boerner sampler.

The method of operating the Black-Shea sieving device in this determination is the same as the method described for operating the device in determining the broken kernel content in milled rice.

Any kernels of rice, either singly or in clusters, which pass over the No. 12 sieve must be removed from the remaining material which passed over this sieve and be placed with the rice that went through this sieve but which passed over the No.  $6\frac{1}{2}$  sieve.

The mud lumps, cereal grains, weed seeds, and other foreign material which pass over the No. 12 sieve together with all of the material of every kind which passes through the No.  $6\frac{1}{2}$  sieve function as "separable foreign material and finely broken kernels."

The rice which passes over the No.  $6\frac{1}{2}$  sieve should be analyzed for mud lumps, cereal grains, and weed seeds. Mud lumps and cereal grains, when found in this portion of the rice, are grading factors, and the sample must be graded for each of these factors according to the limits prescribed in the standards on pages 35 and 37. Weed seeds found in this portion determine whether the rice is of a straight grade or is "seedy," "very seedy," or "Sample grade" on account of seeds, as specified in the standards on pages 39 and 40.

## APPARATUS FOR GRADING ROUGH, BROWN, AND MILLED RICE ACCORDING TO THE OFFICIAL STANDARDS

For the information of persons who desire to equip laboratories for the grading of rough rice, brown rice, and milled rice according to the official standards of the United States the following equipment is regarded as essential:

1. Brown-Duvel moisture tester, completely equipped with flasks, certified centigrade thermometers to read correctly from 170° to 200° C.; graduates of 25 c. c. capacity; one-hole rubber stoppers, sizes No. 5 and No. 3; condenser tubes; 150 c. c. oil-measuring device; supply of oil, etc. (See U. S. Department of Agriculture Bulletin No. 1375; also fig. 5, p. 56.)

2. Supply of glass wool, of medium fine texture, for use in flasks in making moisture tests.

3. Balance, capacity 1,000 grams, sensitive to one-tenth gram, with set of weights, 1 gram to 1,000 grams. (Desirable, but not essential.)

4. Balance, capacity 500 grams, sensitive to one-tenth gram, with set of weights, 1 gram to 500 grams.

5. Balance, capacity approximately 50 grams, graduated beam to read 1 gram and fractions of a gram, sensitive to one-tenth gram, with set of weights, 1 gram to 50 grams.

6. A Boerner sampler for correctly dividing a sample of milled rice or brown rice into smaller portions for analysis and moisture determinations. (See U. S. Department of Agriculture Bulletin No. 287; also fig. 3, p. 53.)

7. A modified Boerner sampler for correctly dividing a sample of rough rice into smaller por-

tions for analysis and moisture determinations. (See U. S. Department of Agriculture Bulletin No. 857; also fig. 4, p. 54.)

8. Black-Shea sieving machine equipped with motor and sieves:

(a) No. 12 sieve: With round perforations twelve sixty-fourths inch in diameter, made to fit snugly into the sieving machine.

(b) No. 6½ sieve: With round perforations six and one-half sixty-fourths inch in diameter, made to fit snugly into the sieving machine.

(c) No. 6 sieve: With round perforations six sixty-fourths inch in diameter, made to fit snugly into the sieving machine.

(d) No. 5½ sieve: With round perforations five and one-half sixty-fourths inch in diameter, made to fit snugly into the sieving machine.

9. Smith shelling device, equipped with motor and automatic cut-off switch.

10. Bates laboratory aspirator for removing hulls from "shellings" of rough rice.

11. Trier for bulk rough rice. The trier should be double-shelled and divided into compartments, and should be 60 inches long. (See fig. 2, p. 51.)

12. Sampling canvas, 5 by 2 feet in dimensions, on which to empty the rice from the trier.

13. Trier for sacked rough rice.

14. Rice trier with core for sampling sacked milled rice and brown rice. (See fig. 1, p. 49.)

15. Air-tight containers (sample cans) capacity approximately 500 grams.

16. Cloth sample bags, waterproofed, capacity at least 2 quarts.

17. Grain pans, with spout for pouring into other containers.

In addition to the apparatus listed above, the following equipment will be found convenient and desirable:

1. Extra moisture-testing equipment: Flasks, thermometers, graduates, rubber stoppers, test-tube cleaners, etc.

2. Five-gallon oil can equipped with oil-measuring device.

3. Five-gallon oil can equipped with strainer funnel and faucet to recover oil.

4. Five-gallon refuse can.

5. Small funnel to fit in moisture flasks for pouring sample into flasks.

6. Tweezers for mechanical analysis.

7. Small grain scoop.

8. Brush for cleaning up rice.

9. Heavy table for handling samples, analysis, etc.

10. Furniture, including chairs, stationery supplies, files, etc., to keep proper records.

### FURTHER INFORMATION

For further information regarding the inspection and grading of rice in accordance with the provisions of the United States standards for milled, brown, and rough rice, apply to any Federal field office of rice investigations or to the Bureau of Agricultural Economics, United States Department of Agriculture, Washington, D. C.

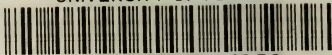
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